

Figure 1

Pfu	MILDVDYITTEOKPVIRLFFKENGKPKIEHRTFRPYIYALLRDDSKIIEVKKKITGERHG	10	20	30	40	50	60
DeepVent	MILDADYITTEOKPITIRLFFKENGKPKIEHRTFRPYIYALLKDDSDIDEVKKKITAERHG						
Hybrid_design	MILDVDYITTEOKPVIRLFFKENGKPKIEHRTFRPYIYALLXDDSDIXEVKKKITXERHG						
Pfu	KIVRIIVDVEKVEKKFLGKPTIIVWKLYLEHPQDVPTIREKVRHPAVVDIPEYDIPPAKRY	70	80	90	100	110	120
DeepVent	KIVRIIDAEKVRKKFLGRPIEVWRRLYFEHPQDVPAIRDKIREHSAVIDIPEYDIPPAKRY						
Hybrid_design	KIVRIIXDXEKVXKKFLGXPIXVWXLYXEHPODVPXIRXKXREHXAAXDIFEYDIPPAKRY						
Pfu	LIDKGLIPMEGEELKILAFDIETLYHEGEELGKQPIIMISYADENEAKVITWKNIDLPY	130	140	150	160	170	180
DeepVent	LIDKGLIPMEGEDERLKLAFDIETLYHEGEELFAKQPIIMISYADEEAEKVITWKKIDLPY						
Hybrid_design	LIDKGLIPMEGXEEELKXLAFDIETLYHEGEELXKQPIIMISYADENXAEKVITWKKXIDLPY						
Pfu	VEVVSSEEMIKKFLRIIREKDDPIIVTYNGDSFDFPYLAKRAEKLGKIKLPLCRDGSBPX	190	200	210	220	230	240
DeepVent	VEVVSSEEMIKKFLKVIIEKDDPDIIVTYNGDSFDFPYLVKRAEKLGKIKLPLCRDGSBPX						
Hybrid_design	VEVVSSEEMIKKFLXXIIEKDDPXIXTYNGDSFDFPYLXKRAEKLGKIKLXXGRDGSBPX						
Pfu	MQRIGDMTAVEVKGRIHFDLYHVIIRRTINLPTTYTLEAVYEAIFGKPKKVVADIEIAKAWE	250	260	270	280	290	300
DeepVent	MQRIGDMTAVEIKGRIHFDLYHVIIRRTINLPTTYTLEAVYEAIFGKPKKVVADIEIAEAWE						
Hybrid_design	MQRIGDMTAVEXXKGRIHFDLYHVIIRRTINLPTTYTLEAVYEAIFGKPKKVVAXXIEIAXAWE						
Pfu	SGENLERVAKYSMEDAKTYELGKEFLPMEIQLSRLVGGPLWDVSRSSSTGNLVWFLLRK	310	320	330	340	350	360
DeepVent	TGKGLERVAKYSMEDAKVTYELGREFFPMEAQLSRLVGGPLWDVSRSSSTGNLVWFLLRK						
Hybrid_design	XGXNLERVAKYSMEDAKXTYELGXEFXPMEXQLSRLVGGPLWDVSRSSSTGNLVWFXLLRK						
Pfu	AYERNEVAPNKESEFEYQRRRLRESYTGQFVKEPEKOLWENIVYLDFFRALYPSIITHNV	370	380	390	400	410	420
DeepVent	AYERNELAPNKPDEREYERRRLRESYAGGYVKEPEKOLWEGLVSLDFRSLYPSIITHNV						
Hybrid_design	AYERNEVAPNKESEFEYQRRRLRESYTGQFVKEPEKOLWENIVYLDFFRALYPSIITHNV						
Pfu	PDTLNLLEGCKNVDIAPOVGHKFKCDIPGFIPLSLGHLEERQKIKIRMKETQDPIEKILL	430	440	450	460	470	480
DeepVent	PDTLNLLEGCKREYDVAPAEVGHKFKCDIPGFIPLSLKRLDERQEIIRKMKKASDPIEKML						
Hybrid_design	PDTLNLLEGCKNVDIXAPXVGHKFKCDXPGFIPLSLXXLXERQXIKXKMKXXXDPIEKXXL						
Pfu	DYRQAKIKLILANSFYGYGYAKARWYCKECAESVTAWGRKVIELVWKELEEKFGFKVLYI	490	500	510	520	530	540
DeepVent	DYRQAKIKLILANSFYGYGYAKARWYCKECAESVTAWGRKVIELVWKELEEKFGFKVLYI						
Hybrid_design	DYRQAKIKLILANSFYGYGYAKARWYCKECAESVTAWGRKVIEXVXKELEEKFGFKVLYI						
Pfu	DTDGLYATIPGSGSEEEKKKALEFPYKYINSKLPOLLELEYEGFYKGGFFVTAKRYAVVIDE	550	560	570	580	590	600
DeepVent	DTDGLYATIPGAKPPEEEKKKALEFPYKYINAKLPOLLELEYEGFYVGGFFVTAKRYVALIDE						
Hybrid_design	DTDGLYATIPGXGXSEEEKKKALEFPYKYINXKLPOLLELEYEGFYXNGGFFVTAKRYAXIDE						
Pfu	EGKVITRGLEIVRRDWEIAKETQARVLEITLKHGDVFEAVRIYKEYIQKLIANYEIPPEK	610	620	630	640	650	660
DeepVent	EGKIIITRGLEIVRRDWEIAKETQAKVLEAITLKHGNVEEAVKIVKEVTEKLSKYEIPPEK						
Hybrid_design	EGKVITRGLEIVRRDWEIAKETQAXVLEXVLEAVXVKEVXXKLLXXYEIPPEK						
Pfu	LAIYEQITRPLHEYKAIGPHVAVAKKLAAGVYKIPGMVIGYIVLEGGDGPISNRAILAE	670	680	690	700	710	720
DeepVent	LVIYEQITRPLHEYKAIGPHVAVAKRLAARGVYKIPGMVIGYIVLEGGDGPISKRAILAE						
Hybrid_design	LXIYEQITRPLHEYKAIGPHVAVAKXLAAXGVKXXPGMVIGYIVLEGGDGPISXRAILAE						
Pfu	YDIPKXHKYDAEYYIENQVLPVAVLRILEGFGYRKEDLRVQKTRQVGLTSWLNKKS	730	740	750	760	770	780
DeepVent	FDLRKHKKYDAEYYIENQVLPVAVLRILEAFGYRKEDLRWQKTRQVGLTSWLNKKS						
Hybrid_design	XDXXKHKKYDAEYYIENQVLPVAVLRILEXFGYRKEDLRXQKTRQVGLTSWLNKKS						
Pfu		790	800	810	820	830	840
DeepVent							
Hybrid_design	NHDD						

Figure 2. Assembly of the oligonucleotides into library fragments.

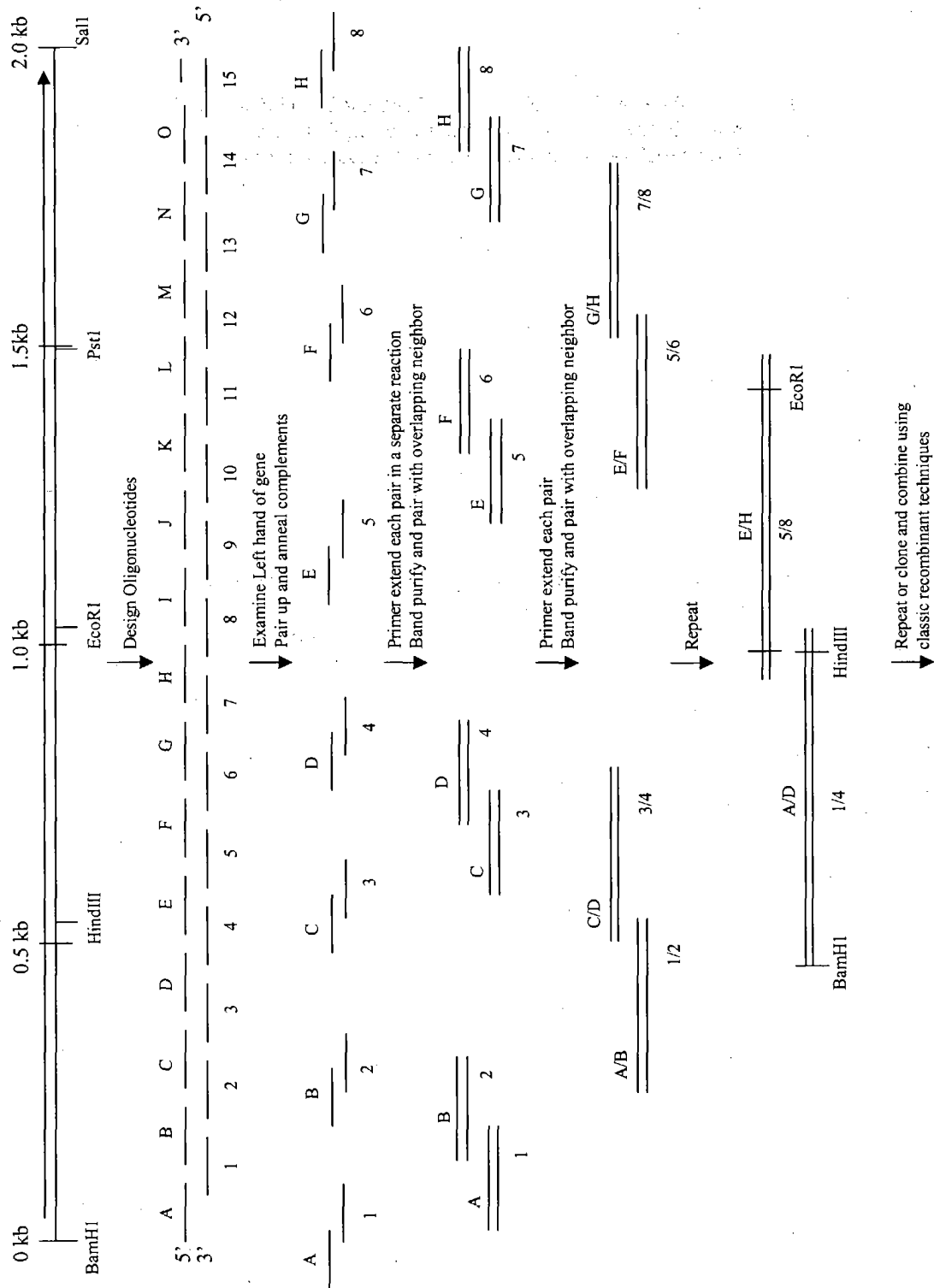


Figure 3. A comparison of the polymerase to 3' to 5' exonuclease activity

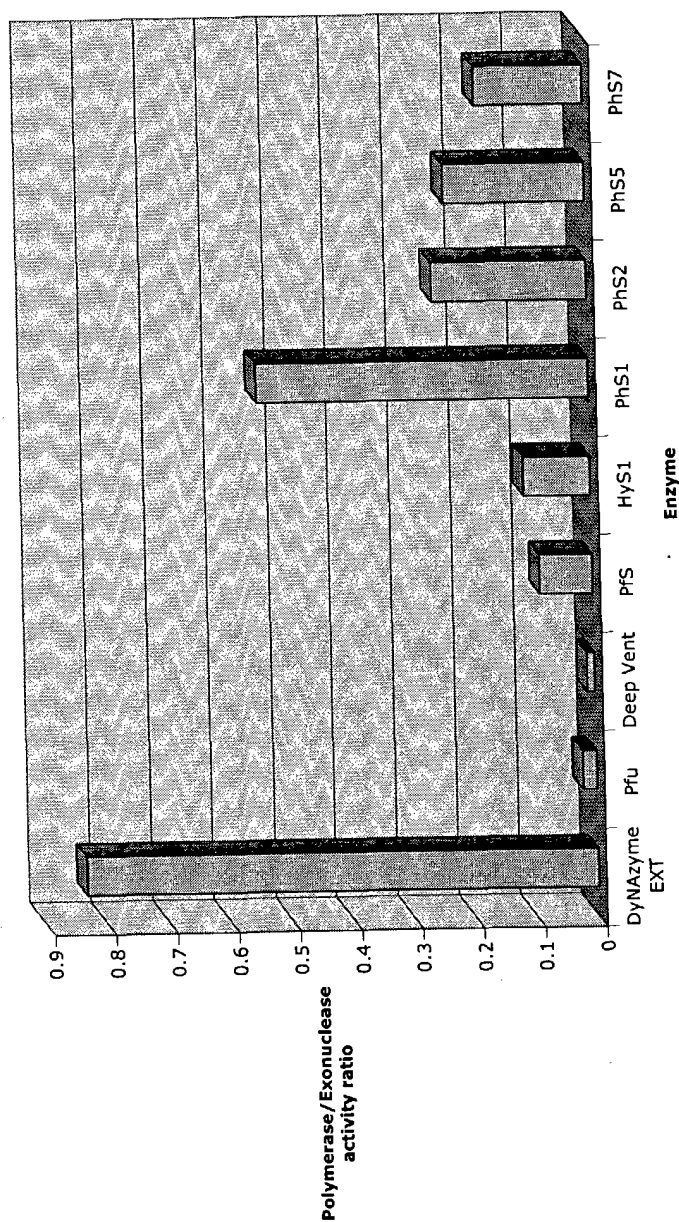


FIGURE 4

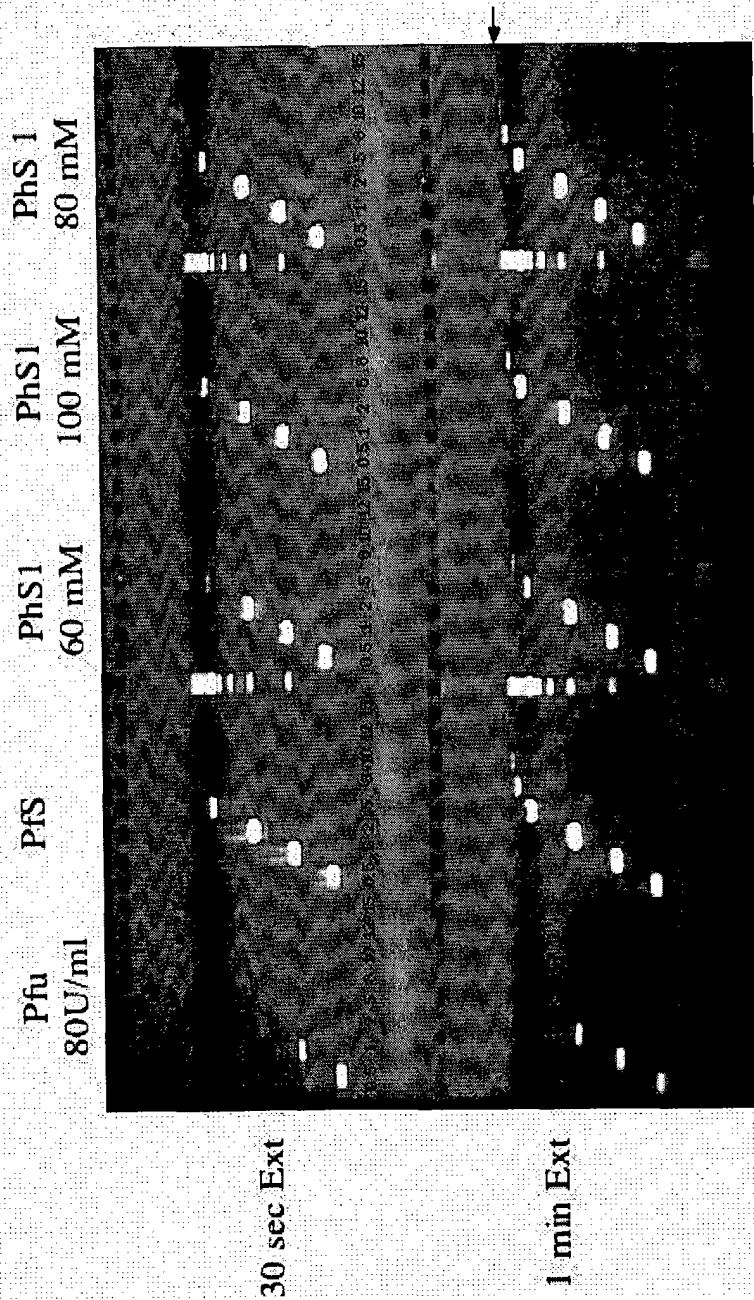


Figure 5.

Pfu	MILDVDYITEEGKPVIRLFKKENGKFKLEHRTFRPYIYALLRDDSQTSEVKKITGERHG	10	20	30	40	50	60
DeepVent	MILDADYITEEDGKPIIRLFKKENGKFKVEYDRNFRPYIYALLKDDSQIDEVKKITGERHG						
Hybrid_design	MILDADYITEEXGKPIIRLFKKENGKFKVEYDRNFRPYIYALLKDDSQIXEVKKITGERHG						
HyS1	MILDADYITEEDGKPVIRLFKKENGKFKLEHRTFRPYIYALLRDDSQTSEVKKITGERHG						
Hyb2	MILDADYITEEGKPVIRLFKKENGKFKVEYDRNFRPYIYALLKDDSKIDEVKKITGERHG						
Hyb3	MILDADYITEEGKPVIRLFKKENGKFKVEYDRNFRPYIYALLKDDSKIDEVKKITGERHG						
HyS4	MILDADYITEEGKPVIRLFKKENGKFKVEYDRNFRPYIYALLKDDSKIDEVKKITGERHG						
PhS1	MILDADYITEEGKPVIRLFKKENGKFKLEHRTFRPYIYALLKDDSKIDEVKKITGERHG						
PhS2	MILDVDYITEEGKPVIRLFKKENGKFKVEYDRNFRPYIYALLKDDSKIDEVKKITGERHG						
PhS3	MILDADYITEEGKPIIRLFKKENGKFKVEYDRNFRPYIYALLKDDSKIDEVKKITGERHG						
PhS4	MILDADYITEEGKPVIRLFKKENGKFKVEYDRNFRPYIYALLRDDSQTIDEVKKITGERHG						
PhS5	MILDADYITEEDGKPIIRLFKKENGKFKVEYDRNFRPYIYALLRDDSQTIDEVKKITGERHG						
PhS6	MILDADYITEEDGKPIIRLFKKENGKFKVEYDRNFRPYIYALLRDDSQTIDEVKKITGERHG						
PhS7	MILDADYITEEDGKPIIRLFKKENGKFKVEYDRNFRPYIYALLRDDSQTIDEVKKITGERHG						
Pfu	KIVRIYDAEKVEKKFLGRPIITVWRLYFEHPQDVPAIRDKVREHPAVVDIFEYDIPFAKRY	70	80	90	100	110	120
DeepVent	KIVRIYDAEKVKKFLGRPIITVWRLYFEHPQDVPAIRDKVREHSAVVDIFEYDIPFAKRY						
Hybrid_design	KIVRIYDAEKVKKFLGRPIITVWRLYFEHPQDVPAIRDKVREHSAVVDIFEYDIPFAKRY						
HyS1	KIVRIYDAEKVKKFLGRPIITVWRLYFEHPQDVPTIREKIREHSAVVGIFEYDIPFAKRY						
Hyb2	KIVRIYDAEKVKKFLGRPIITVWRLYFEHPQDVPTIREKIREHSAVVGIFEYDIPFAKRY						
Hyb3	KIVRIYDAEKVKKFLGRPIITVWRLYFEHPQDVPTIREKIREHSAVVGIFEYDIPFAKRY						
HyS4	KIVRIYDAEKVKKFLGRPIITVWRLYFEHPQDVPTIREKIREHSAVVGIFEYDIPFAKRY						
PhS1	KIVRIYDAEKVKKFLGRPIITVWRLYFEHPQDVPTIREKIREHSAVVDIFEYDIPFAKRY						
PhS2	KIVRIYDAEKVKKFLGRPIITVWRLYFEHPQDVPTIREKIREHSAVVDIFEYDIPFAKRY						
PhS3	KIVRIYDAEKVKKFLGRPIITVWRLYFEHPQDVPTIREKIREHSAVVDIFEYDIPFAKRY						
PhS4	KIVRIYDAEKVKKFLGRPIITVWRLYFEHPQDVPAIRDKVREHSAVVDIFEYDIPFAKRY						
PhS5	KIVRIYDAEKVKKFLGRPIITVWRLYFEHPQDVPAIRDKVREHSAVVDIFEYDIPFAKRY						
PhS6	KIVRIYDAEKVKKFLGRPIITVWRLYFEHPQDVPAIRDKVREHSAVVDIFEYDIPFAKRY						
PhS7	KIVRIYDAEKVKKFLGRPIITVWRLYFEHPQDVPAIRDKVREHSAVVDIFEYDIPFAKRY						
Pfu	LIDKGLIPMEGEELKILAFDIETLYHEGEEFGKGPIMISYADENEAKVITWKKIDLPY	130	140	150	160	170	180
DeepVent	LIDKGLIPMEGEELKILAFDIETLYHEGEEFGKGPIMISYADENEAKVITWKKIDLPY						
Hybrid_design	LIDKGLIPMEGEELKILAFDIETLYHEGEEFGKGPIMISYADENEAKVITWKKIDLPY						
HyS1	LIDKGLIPMEGEELKILAFDIETLYHEGEEFGKGPIMISYADENEAKVITWKKIDLPY						
Hyb2	LIDKGLIPMEGEELKILAFDIETLYHEGEEFGKGPIMISYADENEAKVITWKKIDLPY						
Hyb3	LIDKGLIPMEGEELKILAFDIETLYHEGEEFGKGPIMISYADENEAKVITWKKIDLPY						
HyS4	LIDKGLIPMEGEELKILAFDIETLYHEGEEFGKGPIMISYADENEAKVITWKKIDLPY						
PhS1	LIDKGLIPMEGEELKILAFDIETLYHEGEEFGKGPIMISYADENEAKVITWKKIDLPY						
PhS2	LIDKGLIPMEGEELKILAFDIETLYHEGEEFGKGPIMISYADENEAKVITWKKIDLPY						
PhS3	LIDKGLIPMEGEELKILAFDIETLYHEGEEFGKGPIMISYADENEAKVITWKKIDLPY						
PhS4	LIDKGLIPMEGEELKILAFDIETLYHEGEEFGKGPIMISYADENEAKVITWKKIDLPY						
PhS5	LIDKGLIPMEGEELKILAFDIETLYHEGEEFGKGPIMISYADENEAKVITWKKIDLPY						
PhS6	LIDKGLIPMEGEELKILAFDIETLYHEGEEFGKGPIMISYADENEAKVITWKKIDLPY						
PhS7	LIDKGLIPMEGEELKILAFDIETLYHEGEEFGKGPIMISYADENEAKVITWKKIDLPY						
Pfu	VEVVSSEEMIKRFLRVIIEKDPDIITYNGDSFDLPYLAKRAEKLGIKLPGRDGESEPK	190	200	210	220	230	240
DeepVent	VEVVSSEEMIKRFLRVIIEKDPDVIITYNGDSFDLPYLAKRAEKLGIKLPGRDGESEPK						
Hybrid_design	VEVVSSEEMIKRFLRVIIEKDPDXITYNGDSFDLPYLAKRAEKLGIKLPGRDGESEPK						
HyS1	VEVVSSEEMIKRFLRVIIEKDPDIITYNGDSFDLPYLAKRAEKLGIKLPGRDGESEPK						
Hyb2	VEVVSSEEMIKRFLRVIIEKDPDVIITYNGDSFDLPYLAKRAEKLGIKLPGRDGESEPK						
Hyb3	VEVVSSEEMIKRFLRVIIEKDPDVIITYNGDSFDLPYLAKRAEKLGIKLPGRDGESEPK						
HyS4	VEVVSSEEMIKRFLRVIIEKDPDVIITYNGDSFDLPYLAKRAEKLGIKLPGRDGESEPK						
PhS1	VEVVSSEEMIKRFLRVIIEKDPDIITYNGDSFDLPYLAKRAEKLGIKLPGRDGESEPK						
PhS2	VEVVSSEEMIKRFLRVIIEKDPDIITYNGDSFDLPYLAKRAEKLGIKLPGRDGESEPK						
PhS3	VEVVSSEEMIKRFLRVIIEKDPDVIITYNGDSFDLPYLAKRAEKLGIKLPGRDGESEPK						
PhS4	VEVVSSEEMIKRFLRVIIEKDPDIITYNGDSFDLPYLAKRAEKLGIKLPGRDGESEPK						
PhS5	VEVVSSEEMIKRFLRVIIEKDPDIITYNGDSFDLPYLAKRAEKLGIKLPGRDGESEPK						
PhS6	VEVVSSEEMIKRFLRVIIEKDPDIITYNGDSFDLPYLAKRAEKLGIKLPGRDGESEPK						
PhS7	VEVVSSEEMIKRFLRVIIEKDPDIITYNGDSFDLPYLAKRAEKLGIKLPGRDGESEPK						
Pfu	MQRIGDMTAVEYKGRIFHFDLYHYVIRRTINLPITYTLEAVYEAIFGKPKKEKYYADEIAEAW	250	260	270	280	290	300
DeepVent	MQRIGDMTAVEYKGRIFHFDLYHYVIRRTINLPITYTLEAVYEAIFGKPKKEKYYADEIAEAW						
Hybrid_design	MQRIGDMTAVEYKGRIFHFDLYHYVIRRTINLPITYTLEAVYEAIFGKPKKEKYYADEIAEAW						
HyS1	MQRIGDMTAVEYKGRIFHFDLYHYVIRRTINLPITYTLEAVYEAIFGKPKKEKYYADEIAEAW						
Hyb2	MQRIGDMTAVEYKGRIFHFDLYHYVIRRTINLPITYTLEAVYEAIFGKPKKEKYYADEIAEAW						
Hyb3	MQRIGDMTAVEYKGRIFHFDLYHYVIRRTINLPITYTLEAVYEAIFGKPKKEKYYADEIAEAW						
HyS4	MQRIGDMTAVEYKGRIFHFDLYHYVIRRTINLPITYTLEAVYEAIFGKPKKEKYYADEIAEAW						
PhS1	MQRIGDMTAVEYKGRIFHFDLYHYVIRRTINLPITYTLEAVYEAIFGKPKKEKYYADEIAEAW						
PhS2	MQRIGDMTAVEYKGRIFHFDLYHYVIRRTINLPITYTLEAVYEAIFGKPKKEKYYADEIAEAW						
PhS3	MQRIGDMTAVEYKGRIFHFDLYHYVIRRTINLPITYTLEAVYEAIFGKPKKEKYYADEIAEAW						
PhS4	MQRIGDMTAVEYKGRIFHFDLYHYVIRRTINLPITYTLEAVYEAIFGKPKKEKYYADEIAEAW						
PhS5	MQRIGDMTAVEYKGRIFHFDLYHYVIRRTINLPITYTLEAVYEAIFGKPKKEKYYADEIAEAW						
PhS6	MQRIGDMTAVEYKGRIFHFDLYHYVIRRTINLPITYTLEAVYEAIFGKPKKEKYYADEIAEAW						
PhS7	MQRIGDMTAVEYKGRIFHFDLYHYVIRRTINLPITYTLEAVYEAIFGKPKKEKYYADEIAEAW						

Pfu
 DeepVent
 HydrD_design
 HyS1
 Hyb2
 Hyb3
 HyS4
 PhS1
 PhS2
 PhS3
 PhS4
 PhS5
 PhS6
 PhS7

	61	62	63	64	65
Pfu	E	G	K	V	I
DeepVent	E	G	K	V	I
HydrD_design	E	G	K	V	I
HyS1	E	G	K	V	I
Hyb2	E	G	K	V	I
Hyb3	E	G	K	V	I
HyS4	E	G	K	V	I
PhS1	E	G	K	V	I
PhS2	E	G	K	V	I
PhS3	E	G	K	V	I
PhS4	E	G	K	V	I
PhS5	E	G	K	V	I
PhS6	E	G	K	V	I
PhS7	E	G	K	V	I

Pfu
DeepVent
Hybrid_design
HyS1
Hyb2
Hyb3
HyS4
PhS1
PhS2
PhS3
PhS4
PhS5
PhS6
PhS7

850 860 870 880 890 900

Figure 6

